

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

KIM, Seong-Ki

14F., Kukdong Building, 60-1, Chungmuro3-ka, Chung-ku  
Seoul 100-705, Republic of Korea

## PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) 21 AUGUST 2004 (21.08.2004)

From  
KIPO

Applicant's or agent's file reference  
FPC04015-PCT

**FOR FURTHER ACTION**

See paragraph 2 below

2004 08. 26

International application No.

**PCT/KR2004/001090**

International filing date (day/month/year)

**12 MAY 2004 (12.05.2004)**

Priority date(day/month/year)

**16 MAY 2003 (16.05.2003)**

International Patent Classification (IPC) or both national classification and IPC

**IPC7 C08F 283/04, C08F 212/08**

Applicant

**LG CHEM, LTD. et al**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



Korean Intellectual Property Office  
920 Dunsan-dong, Seo-gu, Daejeon 302-701,  
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, Suk Ju

Telephone No. 82-42-481-8149



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/001090

**Box No. I Basis of this opinion**

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing  
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format  
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE  
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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	1-13	YES
	Claims	None	NO
Inventive step (IS)	Claims	1,3-4, 6-7, 9-12	YES
	Claims	2,5,8,13	NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims	None	NO

**2. Citations and explanations :**

Reference is made to the following documents:

D1: JP 06-248017 A

D2: US 5,442,041 A

D3: JP 2002-146038 A

The present invention relates to a method for preparing copolymers of styrene and maleimide by imidization-estrusion of copolymers of styrene and maleic anhydride using a supercritical fluid.

Document D1 relates to a method for manufacturing copolymer comprising steps of (i) bulk-copolymerizing of a vinyl aromatic compound containing 1-6 wt.% of maleic anhydride and maleic anhydride, (ii) suspension-copolymerizing of the monomer mixture of maleimide and/or an N-substituted maleimide and a vinyl cyanide compound and (iii) imidizing the maleic anhydride residues in the produced copolymer with primary amine and/or ammonium to provide the objective polymer.

Document D2 relates to a method for removing volatile impurities from thermoplastic resin such as a styrene/maleic anhydride copolymer by admixing with a chemical blowing agent to generate supercritical carbon dioxide.

Document D3 discloses a method for producing a polypropylene-based resin composition provided by melting and kneading a mixture containing polypropylene-based resin and olefin-based thermoplastic elastomer in the presence of a supercritical fluid.

**1. Novelty**

Document D1 does not disclose supercritical carbon dioxide in the method for preparing copolymer styrene and maleimide. Documents D2 and D3 do not disclose an imidizing agent or an imidizing agent in a supercritical state.

Therefore, claims 1 -13 of the present invention meet the requirements of Article 33(2) PCT in respect of novelty .

(Continued on Supplemental Box)

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**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of :

BOX V

**2. Inventive step.**

The subject matter of claims 2, 5, 8 and 13 differs from disclosure of D1 mainly in that supercritical carbon dioxide is used for blending copolymers of styrene and maleic anhydride with an imidizing agent. However, supercritical carbon dioxide for blending copolymer or removing impurities is disclosed in D2 and D3.

Accordingly a skilled person in the art could have readily obtained the above claims of the present invention by combining the teachings of D1 and D2-D3. In addition, the above claims of the present invention do not exhibit any sharply improved effect beyond the combination of the effects of D1 and D2-D3.

Therefore, claims 2, 5, 8 and 13 of the present invention do not meet the requirements of Article 33(3) PCT in respect of inventive step.

**3. Concerning Claims 1, 3-4, 6-7 and 9-12**

The subject matter of claims 1, 3-4, 6-7 and 9-12 differs from disclosure of D1-D3 mainly in that an imidizing agent in a supercritical state is used. It is obtained by introducing the imidizing agent into a blending zone having the condition under which the imidizing agent transforms into its supercritical state.

It is cannot be considered obvious to a person skilled in the art, with the knowledge of the cited documents, to use an imidizing agent in a supercritical state.

Therefore, claims 1, 3-4, 6-7 and 9-12 are considered to meet the requirements of Article 33(2) and 33(3) PCT.